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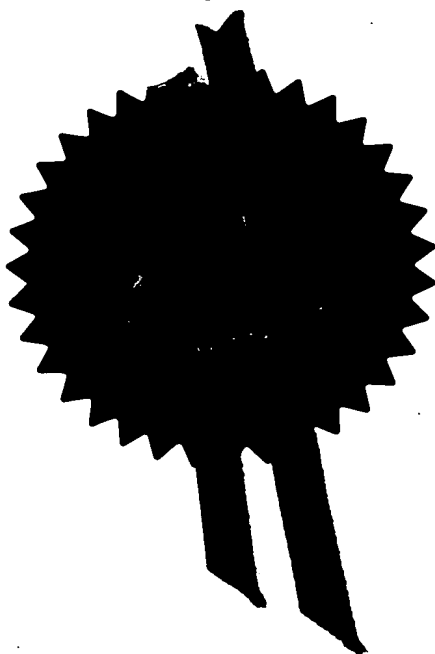
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# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

SL/RK/OML.31

2. Patent application number

(The Patent Office will fill in this part)

14 FEB 1998

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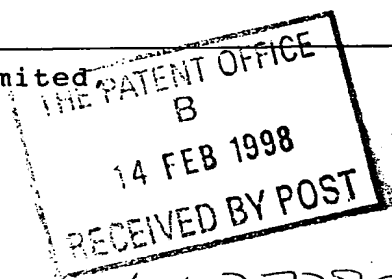
3. Full name, address and postcode of the or of each applicant (underline all surnames)

Owen Mumford Limited  
Brook Hill,  
Woodstock,  
Oxford,  
OX20 1TU.

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom



4413738002

4. Title of the invention

"Improvements relating to Medical Injection Devices"

5. Name of your agent (if you have one)

Wynne-Jones, Laine & James

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

22, Rodney Road,  
Cheltenham,  
Gloucestershire.  
GL50 1JJ

Patents ADP number (if you know it)

1792001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

n/a

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

n/a

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

YES

# Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	-
Description	9
Claim(s)	-
Abstract	-
Drawing(s)	2 + 2

10. If you are also filing any of the following, state how many against each item.

Priority documents	-
Translations of priority documents	-
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	-
Request for preliminary examination and search (Patents Form 9/77)	-
Request for substantive examination (Patents Form 10/77)	-
Any other documents (please specify)	-

11. I/We request the grant of a patent on the basis of this application.

Signature *Wynne-Jones, Lainé & James* Date 13.2.1998

Wynne-Jones, Lainé & James

12. Name and daytime telephone number of person to contact in the United Kingdom

Mr. S. J. Laine  
01242-515807

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Improvements Relating to Medical Injection Devices

This invention relates to medical injection devices. It is particularly concerned with the automatic firing of an injector having a barrel-like body with a sliding trigger on one side to eject the dose from a needle at its forward end. 5 The action of the trigger is forwards against a stiff spring. Preferably, there is a dose setting mechanism such as a rotary knob at its rear end which may be "clicked" round to a desired setting. All the trigger does is to 10 release a spring which shoots a plunger forwards by an amount determined by the knob, this plunger co-operating with a piston in a capsule carrying the dose.

Such injectors are well known, but they require the user to insert the needle into the flesh first, before 15 releasing the trigger. For self-users, this can be particularly difficult: it is natural to flinch and not push the needle in far enough.

The aim of this invention is to provide a device that can automate this operation, ensuring that the injector 20 needle is thrust in to the correct degree before the dose is ejected.

According to the present invention there is provided a firing device for an injector of the kind described, the device comprising a barrel-like housing for the injector, a 25 forward portion of the barrel, open at its forward end for projection of the injector needle, containing a spring-loaded locator for the forward end of the injector to exert

a light rearward force thereon, and a rearward portion of the barrel, connectable to the forward portion to complete the housing of the injector, having an internal spring loaded member to cooperate with the injector trigger, an  
5 external cocking mechanism operable to prime the spring loading of said member, and a trigger to release that loading to cause the member to shoot the injector forward against the light rearward force to a needle projecting position and to operate the trigger to eject the dose from  
10 the injector.

Conveniently the two portions of the barrel screw together.

The spring-loaded member is preferably an internal tube with a coil spring at the rear end reacting against an  
15 internal shoulder at the rear end of the barrel. An axial slot from the forward end of the tube receives the trigger and locates the injector rotationally.

The cocking mechanism may be an external sleeve with at least one lateral projection from the internal tube extending through the rear portion of barrel to engage in an  
20 axially parallel slot in the external sleeve. The cocking action is to pull the exterior sleeve rearwardly, and the projection engaged by the forward end of slot takes the internal tube with it until there is snap engagement with  
25 the trigger mechanism. The injector is pushed back at the same time by the light spring. The external sleeve can then be moved forwards again.

The trigger carried by the external sleeve can have the

outward appearance of simple press button. Internally it will be formed to release a catch that holds the internal tube, and preferably it will be arranged that the button cannot achieve this release unless the external sleeve is in its forward position. In more detail, the trigger button may have two different positions between which it can be shifted by snap action; for example circumferentially of the external sleeve. In one it can fire the device (when the external sleeve is forward) and at the same time act as a lock preventing the external sleeve being slid rearwardly. In another, it will allow the external sleeve to be slid rearwardly (and forwardly again), but will then be ineffective, when pressed, to fire the device.

Many injectors for which a firing mechanism of this type may be designed have a rear end adjuster to set the amount of dose to be ejected. This commonly takes the form of a rotary knob which is "clicked" round by an amount related to the dose. The external sleeve, in its forward position with the device primed, may leave this knob exposed. So before firing, the user can rotate the knob to the required dosage, the marks on the knob registering with a mark on the end of the external sleeve to assist gauging the amount. The injector is held in a predetermined circumferential position by the internal tube co-operating with the trigger, and that sleeve is engaged by its projection in longitudinal slots in the rear portion of the barrel.

For a better understanding of the invention one

embodiment will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a firing device for an injector with a firing button in a locked and firing position,  
5

Figure 2 is a similar side view but with the firing button in a cocked position,

Figure 3 is an axial section of the device, charged with an injector, in an idle position,

10 Figure 4 is a similar axial section with the device just cocked,

Figure 5 is a similar axial section with the device cocked and ready to fire,

15 Figure 6 is a perspective view of a locator tube forming part of the device,

Figure 7 is a perspective view of a barrel into which the locator tube fits, and

Figure 8 is a perspective view of a sleeve into which the barrel fits.

20 The injector 1 to be fired is of known type and will not be described in detail. But its salient features for the purposes of this specification are a needle 2 at its forward end, a rotatable knob 3 at its rear end which is "clicked" round to set the desired dosage, and an elongate  
25 trigger 4 on the side of the barrel-like body towards the rear end whose firing action is forwards against a stiff spring. The body of the injector narrows at a sloping shoulder 5 towards a forward end portion which has opposed



windows 6 through which the capsule containing the medium to be injected can be seen.

The firing mechanism into which this injector fits has two assemblies 7 and 8 which screw together at 9. The nose assembly 7 consists of a stepped tube 10 with a cylindrical portion 11 forward of a shoulder 12 provided with opposed windows 13 which will register with the windows 6. Internally at the shoulder 12 there is an annular rib 14 which limits the fore and aft travel of a locator ring 15. This has an outwardly projecting rib 16 at its rear end, and a spring 17 acts between that rib and the root of the rib 14 to urge the locator ring 15 rearwardly with a fairly light force. Two diametrically opposed arms 18 project forwardly from the ring 15 and hooks 19 at their ends can snap past the rib 14 on assembly. The travel of the locator ring is determined by the length of these arms 18 to the hooks 19. The locator ring 15 has guide means (not shown) to keep it from rotating while allowing axial movement, and the gaps between the arms 18 register with the windows 13.

The rear assembly 8 consists of a barrel 20, with a wide external annular rib 21 just to the rear of the screw thread by which it is joined to the tube 10, a sleeve 22 encasing the barrel 20 to the rear of the rib 21, a generally tubular locator 23 for the injector within the barrel urged forwardly by a powerful spring 24 reacting against an inturned flange 25 at the rear end of the barrel, and a trigger 26 captive to the sleeve 22.

The locator tube 23 (Figure 6) has a wide slot 27

extending lengthways from its forward end to accommodate the injector trigger 4. Diametrically opposite this a tongue 28 is integrally formed with the tube at its forward end, the free end of the tongue being thickened to project proud of the otherwise cylindrical envelope. The barrel 20 (Figure 7) has two axially spaced slots 29 and 30 with which this tongue 28 can engage. The slot 29 is L-shaped in profile, with its short leg aligned axially with the slot 30. When the barrel 20 is latched into the rear slot 29 it holds the locator tube 23 back against the compressed spring 24, and when released from that it snaps into the forward slot 30 to assist termination of the forward motion of the tube 23. This tube also has two diametrically opposed fins 31 which project through longitudinal slots 32 in the barrel 20, the leading edges of these fins being radial but the rear edges having a shallow slope so that the tube is radially contracted by a wedging action as it is forced rearwardly into the barrel on assembly. The slot 27 makes this deformation possible. When the fins 31 reach the slots 32 they spring outwards making the locator captive to the barrel. Furthermore, their tips are then proud of the barrel and the sleeve 22 (Figure 8) has longitudinal slots 33 in which those tips can engage in like manner, making the sleeve captive also. The leading ends of the slots 33 serve as stops in a manner described below.

The trigger 26 has an exposed button 34 projecting through an aperture 35 in the sleeve which allows the button to be shifted circumferentially between the positions shown

in Figures 1 and 2. The trigger is captive to the sleeve by a plate-like extension 36 from its base which engages under the periphery of the aperture 35 and which at its rear end has an inwardly projecting wedge-shaped stud 37. Below the front of the button there is a thickened portion 38 to co-operate with the tongue 28.

The rear ends of the barrel 20, the sleeve 22 and the locator 23 are open so that the injector 1 can be fitted as shown in Figure 3, the rear end of its trigger 4 bearing against the closed end of the slot 27 and its dose adjusting knob 3 just exposed at the rear end of the injector. The sleeve 22 will have a mark against which rotation of the knob 3 can be gauged; the mark on the injector itself being hidden inside the assembly 8. With the injector so in place, the nose assembly 7 is screwed on, the locator ring 15 engaging the sloping shoulder 5 of the injector and being forced forwardly in relation to the tube 10 against the spring 17. When assembly is complete, the forward end of the ring 15 bears against the rib 14 with the spring 17 compressed. But that spring is not nearly powerful enough to overcome the spring 24 and the locator tube 23 remains in the forward position with the tongue 28 in the forward slot 30.

The needle 2 is left exposed projecting forward of the nose assembly 7. In practice, it will have a protective sheath while this fitting together is carried out, and it will not be removed until just before use.

In the Figures 1 and 3 position of the trigger 26 the

stud 37 is captive in the slot 29 preventing the sleeve 22 from moving rearwardly. The device is in an idle or non-ready condition.

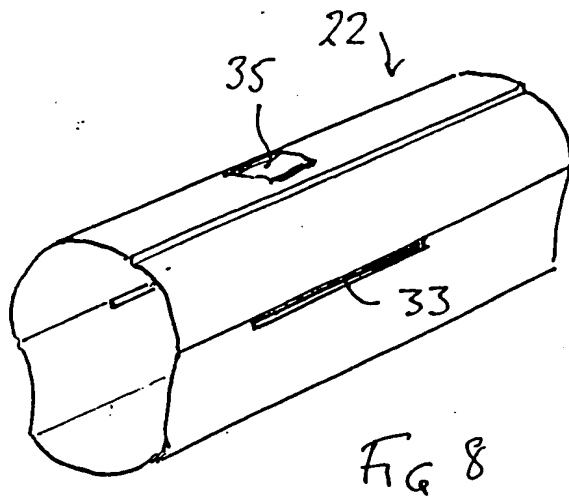
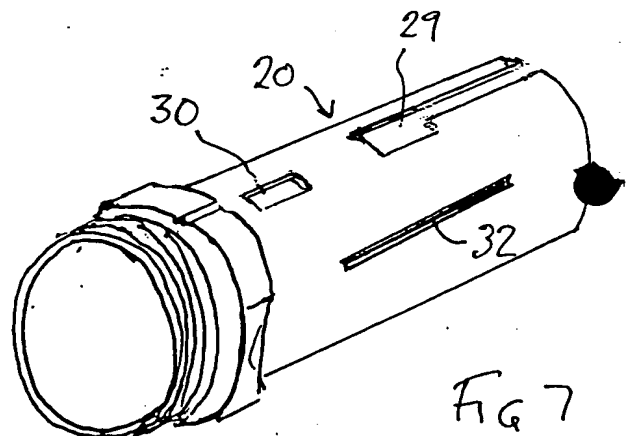
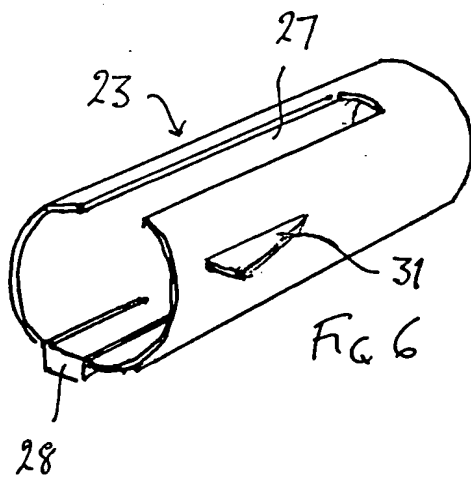
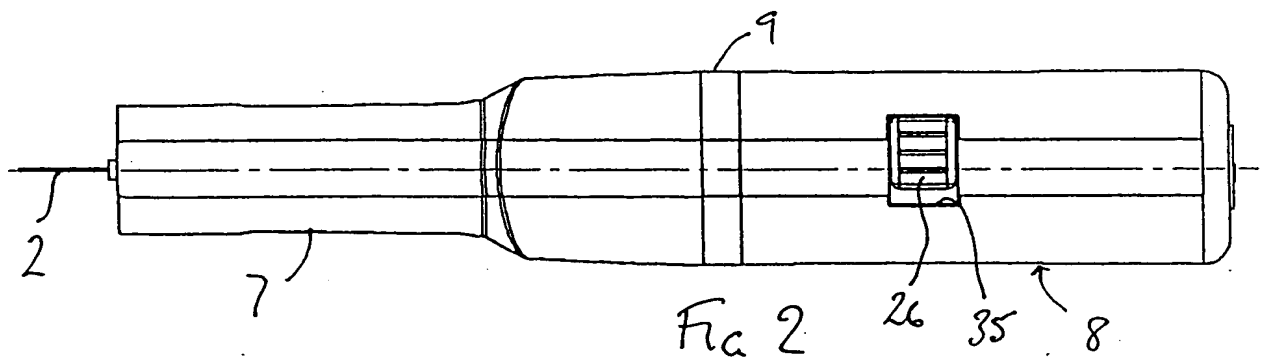
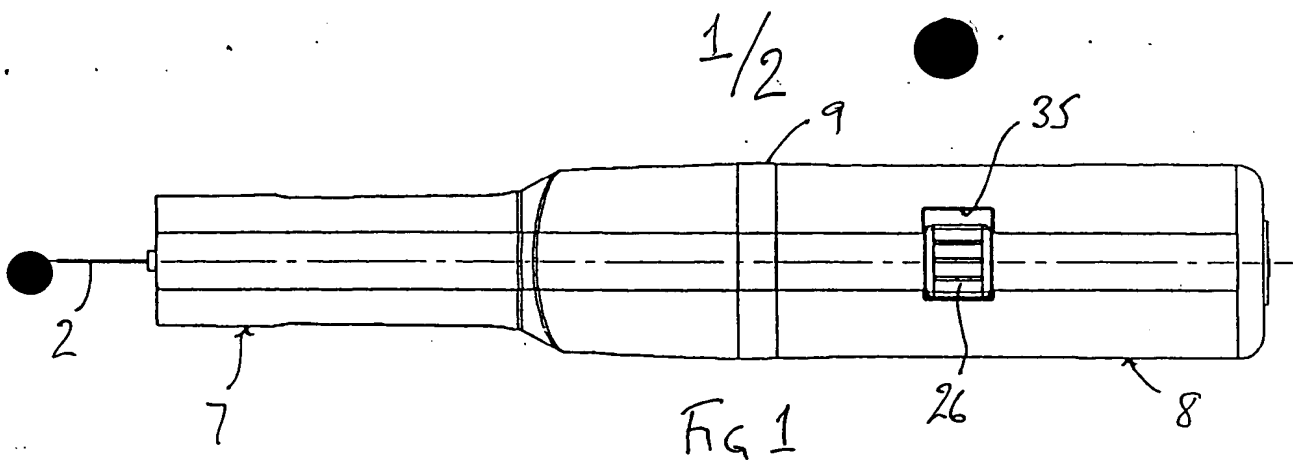
For use, the trigger 26 is pushed round to the Figure 2 position out of engagement with the short leg of the L-shaped slot 29. The circumferential trigger movement also takes the thickened portion 38 out of axial alignment with the tongue 28. The sleeve 22 can then be pulled back and, acting through the forward ends of its slots 33 and the fins 31, this also retracts the locator tube 23, compressing the spring 24. When fully retracted, the tongue 28 snaps into the rear slot 29, latching the device in the position of Figure 4. During this operation the injector 1 is pushed back by the spring 17 acting through the locator ring 15 and the needle 2 is withdrawn into the tube 10.

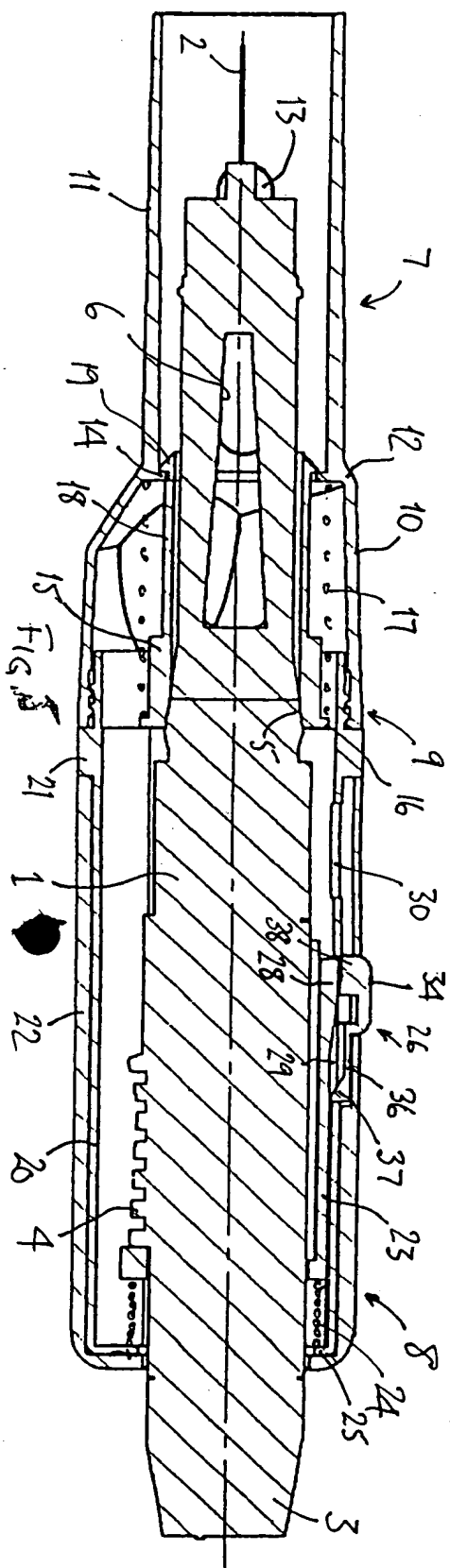
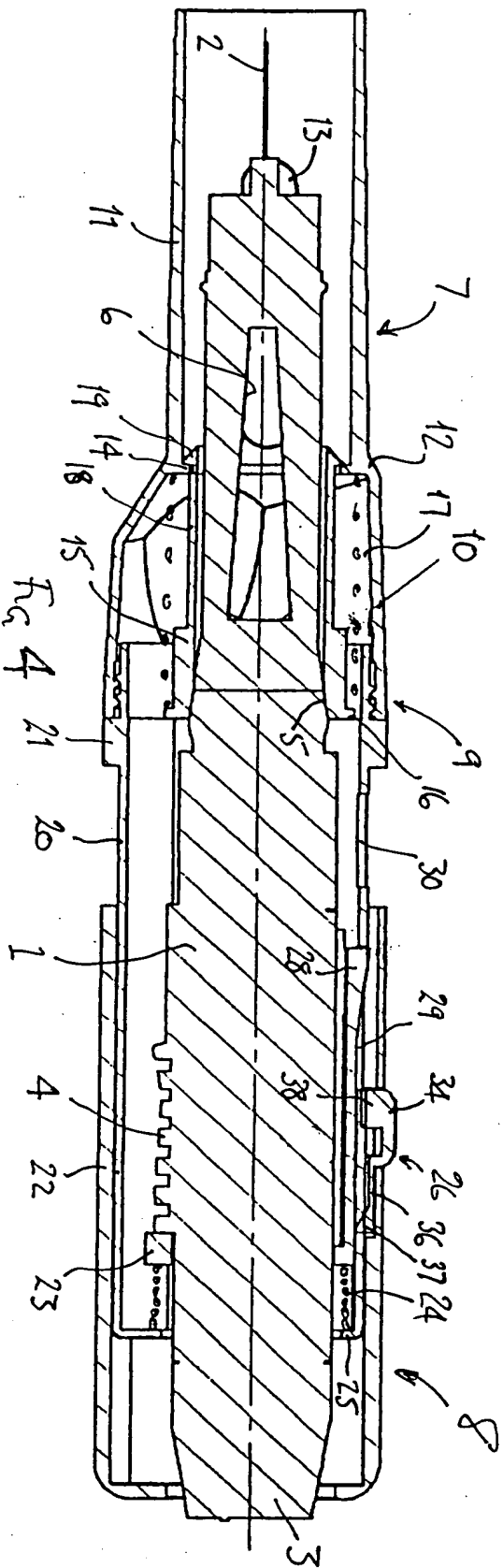
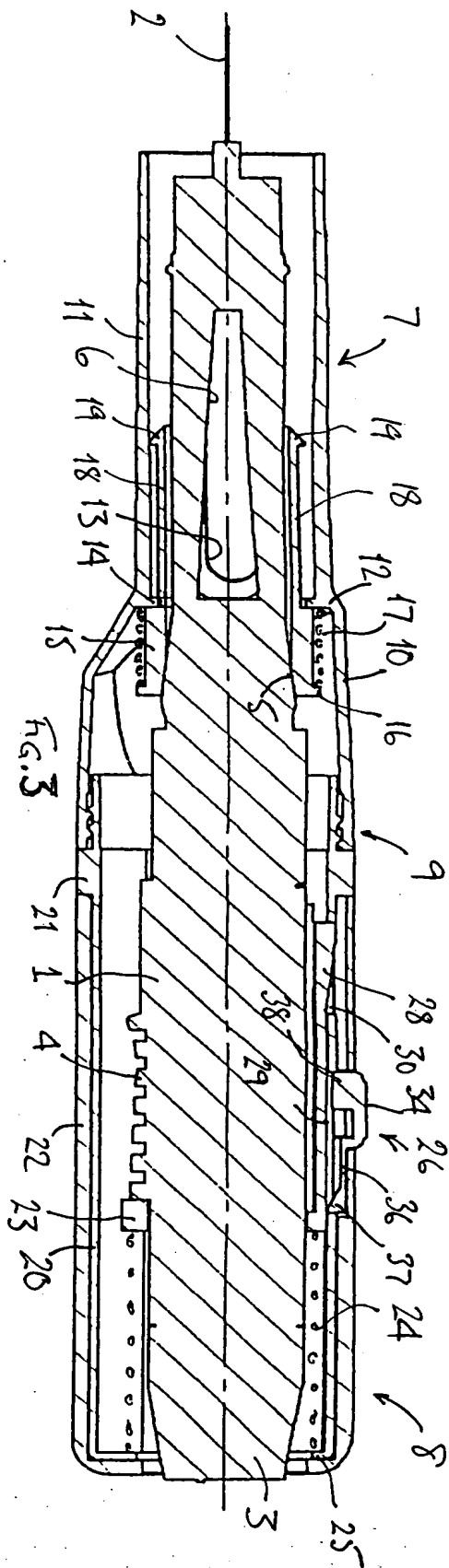
The sleeve 22 is now slid forwards again to abut the rib 21, fully exposing the knob 3, which is rotated to set the required dose. The trigger 26 is pushed back to the Figure 1 position so that the stud 37 re-enters the short leg of the slot 29 while the portion 38 comes directly over the free end of the tongue 28. In this position of Figure 5 the device is ready to fire.

The free end of nose portion 11 is held against the area of skin where the injection is to be made and the button 34 pressed. This releases the tongue 28 from the slot 29 and the spring 24 shoots the locator 23 forwards. The closed end of the slot 27 bearing on the trigger 26 carries the injector forwards as well, causing the needle 2

to penetrate the skin. The trigger 4 is not immediately activated, being held rearwardly by a spring stiffer than the spring 17. But when the locator ring 15 meets the rib 12, the trigger 4 will be pressed forward sufficiently to  
5 trip the action of the injector. The dose is therefore ejected as the forward travel of the injector is completed, back to the Figure 3 condition. The knob 3 returns to its zero position during this ejection.

The cycle is then ready to be repeated.





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